FTD-ID(RS)T-1658-81

(1)

FOREIGN TECHNOLOGY DIVISION

(12) 23

SOME CHARACTERISTICS OF SEA BREEZE CIRCULATION THROUGHOUT THE BLACK SEA ZONE

by

Gheorge Bizic

141600

Approved for public release; distribution unlimited.

82 02 08 205

Best Available Copy

FTD-ID(RS)T-1658-81

EDITED TRANSLATION

FTD-ID(RS)T-1658-81 19 January 1982

MICROFICHE NR: FTD-82-C-000045

SOME CHARACTERISTICS OF SEA BREEZE CIRCULATION THROUGHOUT THE BLACK SEA ZONE

By: Gheorge Bizic

English pages: 21

Source: Hidrotehnica, Vol. 17, Nr. 11, Nov 1972, pp. 605-613

Country of origin: Romania
Translated by: LEO KANNER ASSOCIATES
F33657-81-D-0264
Requester: USAF/ETAC/MAC
Approved for public release; distribution unlimited.

Accession For	
NTIS GRA&I	☑
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A	

THIS TRANSLATION IS A RENDITION OF THE ORIGINAL FOREIGN TEXT WITHOUT ANY ANALYTICAL OR EDITORIAL COMMENT. STATEMENTS OR THEORIES ADVOCATED OR IMPLIED ARE THOSE OF THE SOURCE AND DO NOT NECESSARILY REFLECT THE POSITION OR OPINION OF THE FOREIGN TECHNOLOGY DIVISION.	PREPARED BY: TRANSLATION DIVISION FOREIGN TECHNOLOGY DIVISION WP-AFB, OHIO.

SOME CHARACTERISTICS OF SEA BREEZE CIRCULATION THROUGHOUT THE BLACK SEA ZONE

Gheorge Bizic

Chief scientific researcher of the Institute of Meteorology and Hydrology

Summary

For the purpose of revealing the dynamics of the atmosphere and the potential of alternative influencing by the sea air and continental air, adequate methods were used for establishing and representing graphically the variations in space and time of the wind frequency as regards direction, and the temperature and humidity of the air for the southeastern part of Romania which is located in anticyclonic conditions.

Starting from the idea that at the time of calm, the temperature and humidity of the air are under the dominant influence of the local active surface, the physical characteristics of the air and wind from the sea are brought into relief as compared with those of the land air.

It is a known fact that from the climatic viewpoint, the south-eastern part of Romania is under the effect of the Black

Sea Basin. The territorial distribution and the average monthly values of the climatic parameters indicate the influence in time and space of the sea air over the climate of this zone. The real knowledge, unaffected by statistical estimates made to obtain averages, the distance over which the sea air penetrates to the interior of the land, and the weight of its contribution to the establishment of the climatic characteristics of the climates of the respective zones, is of great theoretical and practical interest.

For the purpose of eliminating as far as possible the influences of the zonal circulation and to detect the details of the mechanism by means of which the sea air is transported over the land, it was necessary to establish adequate methods for processing the data resulting from the meteorological observations. Therefore to be able to know the influence of the sea on the atmospheric circulation as a transport agent or a potential one, the study concerns actually the dynamics of the sea air in the range in in which, in the respective zones, anticyclonic nuclei approach or are centered and their main effects.

It may be assumed that in this baric situation, the atmospheric dynamics of the respective zones are given almost exclusively by the thermal contrast between land and sea and manifested in the form of the phenomenon of breezes.

Because of the large volume of processing needed to reveal the circulation and its effect, this article will take up the analysis only for the month of July, a month in which the energy potential reaches values giving the maximum differences between the physical characteristics of the marine atmospheres and the continental ones.

Consequently for days with anticyclonic differences in the month of July (1961-1970), data were recorded hourly on wind direction and speed, the temperature and relative humidity corresponding to the direction from which the wind blows for a series of 10 meteorological stations located between the coast (Constanta) and the central zone of Cimpiei Romane (Urziceni).

In the course of processing wind data, hourly frequencies were obtained of the wind as regards direction in percentage, for days with anticyclonic conditions. On the basis of the values of the hourly frequencies of the wind in direction, the complex wind rose was established which presents an isopletic structure of the diurnal variations of the wind in time and space. This rose is designed in the form of a series of 25 concentric rings, corresponding to each of the 24 hours of the day, plus a central ring for the hour 0 needed for isopletic connection, in which values of the last ring are recorded that of ring 24 hours, and 8 rays corresponding to the main wind directions. On the basis of the values of the hourly frequency of the winds in the direction in 24 of the rings corresponding to the hours, isopletic lines were plotted, which outline the zones and represent the interval of times of the day in which in anticyclonic conditions, the wind blows in a certain direction with a certain frequency. In the center of the rose, the frequency of calm is given in percentage.

Thus on the basis of the data of the Constanta station, the wind rose of Fig. 1 was established.

From this we find first of all and in a striking manner, the direction of turning of the wind during the night and in the daytime. The helicoidal shape of the areas of equal frequency illustrates the fact that the change of the wind direction in the daytime is achieved within the framework of a process with obvious continuity, on whose basis the interval with calm represents a time of thermal and baric equilibrium in which there is an inversion of the circulation of the daytime breeze, from the sea, to the night time one, from land, and conversely. Thus the maximum frequency ($>30\%$) is achieved by winds blowing from the sea in the noontime (12th hour), when the thermal contrast, therefore the baric one, between sea and land are maximum. Because of these differences starting at 0700-0800 hours and up to 2100-2200 hours, the area of values indicating winds from the eastern direction with frequency much more than 22% reveals the extreme weight of the effect of the sea on the atmospheric circulation of the Romanian coast.

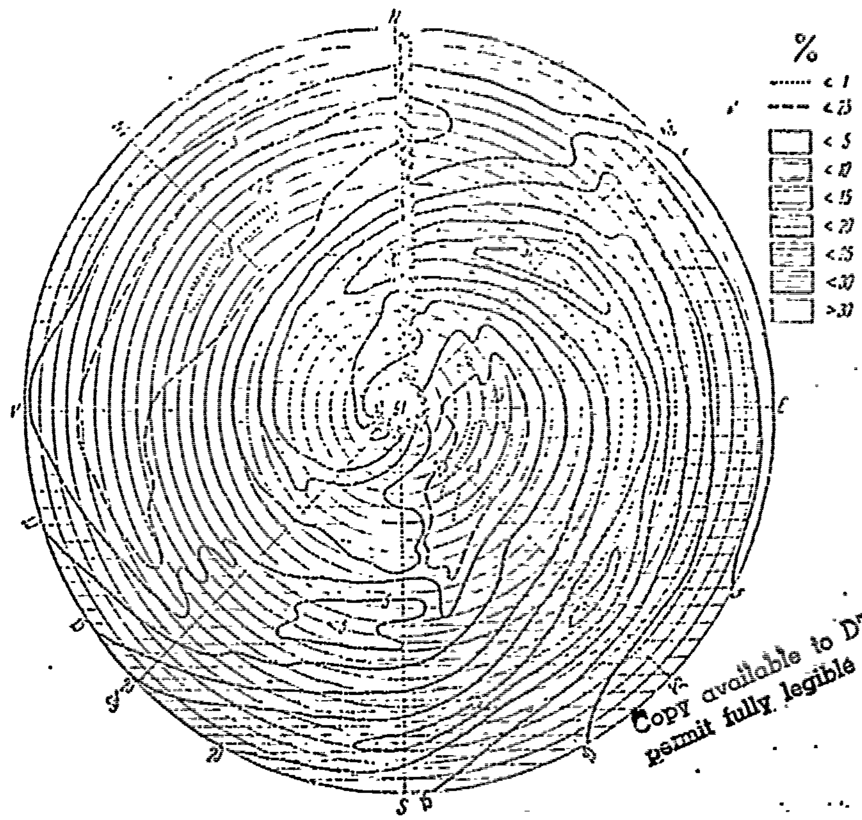


Fig. 1. Diurnal wind frequency (%) on directions, under anticyclonic regime (Constantza — July 1951–70).

The interval with low frequency (<1%) located in the southeastern part (between 0300-0700 hours) is superimposed on that of thermal equilibrium between these 2 types of subjacent surfaces (water-land). In the first few hours after sunrise, the wind may blow with approximately equal frequency (6-16%) either from sea or from land, while in the hours between 1200 and 1[illegible] when the ground is strongly heated, the frequency of the land breeze is very low (< 2.5%).

Starting from 2100 hours and up to 2400-0100 hours the wind blowing from the land (southwest) has a much higher frequency (>20%). This is a particularly interesting general aspect of this wind rose, which indicates the average plastic structure of the dynamics of change of the wind direction in the

framework of the breeze phenomenon.

To complete the picture of this phenomenon and understand its progress in space, we analyzed a large number of radio sondes carried out in Constanta, and chose some in which the tracings of the balloons illustrated most strikingly the breeze type of circulation. In this article we present (Fig. 2) the reconstruction of the evolution in space of the balloons in the framework of 2 radiosondes carried out in typical breeze conditions.

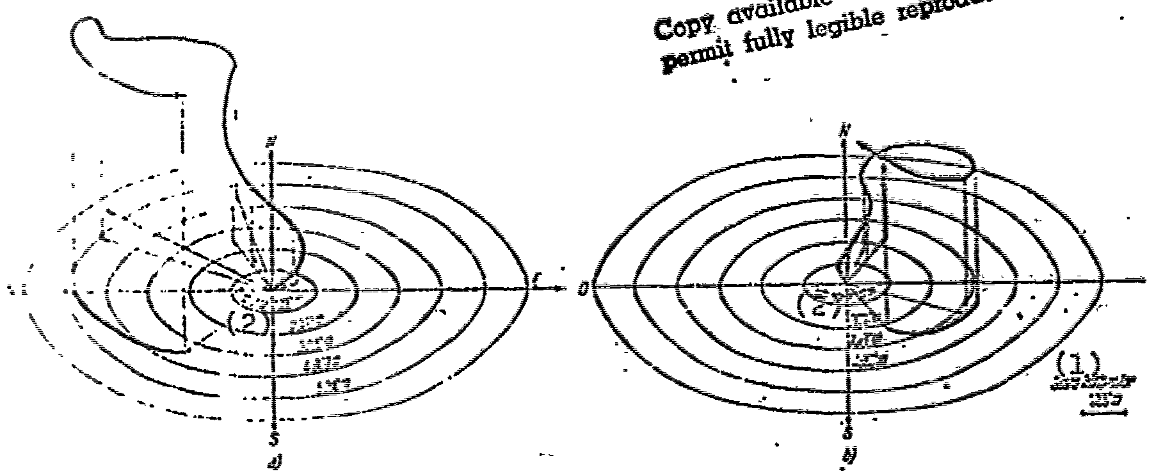


Fig. 2. Evolution of the balloon in two cases:
[illegible] breeze blowing by day (Constanta – July 10, 1966, 13 h); b – during breeze blowing in the night (Constanta – July 17, 1966, 1 h).

Key: (1) Altitude 1000 m; (2) Distance.

Thus, in Fig. 2a which shows a graph representing a test which was carried out on 10 July 1966 at 1300 hours, we observe how the balloon which starts from the station (center of the ring network) up to an altitude of approximately 2000 m turns slightly to the west, and then until approximately 4000 m moves nearly vertically, and after this up to about 5000 m, it is directed to the west. From that altitude, the course on which the balloon moves suffers a strong inversion which indicates its emergence from the atmospheric strata affected by the daytime breeze and the entrance into the western circulation zone. The distance at

which the inversion occurs is nearly 5 km.

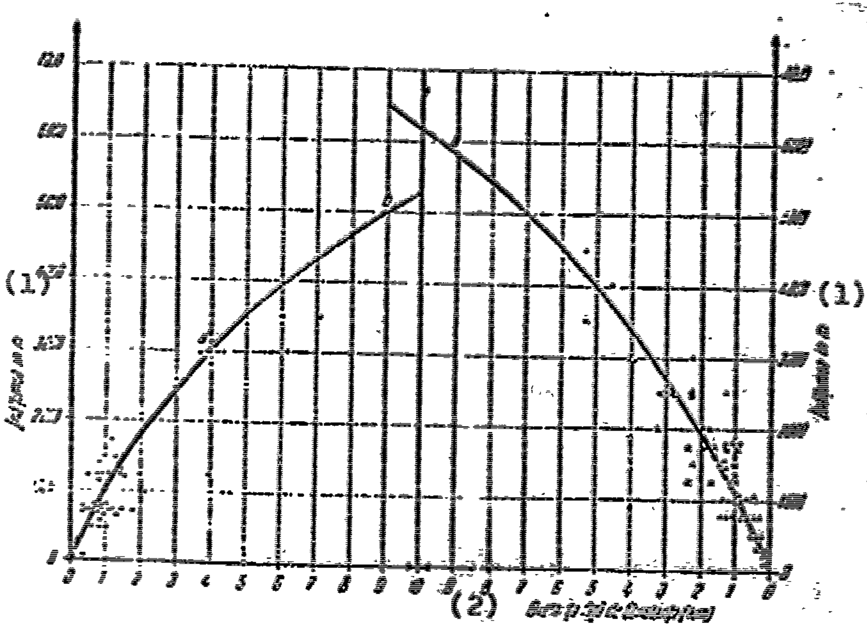
The night breeze (Fig. 2 b) is embodied by the establishment of the curve of movement of the balloon according to the data resulting from the test carried out on 17 July 1963 at [illegible] hours. The form of this curve is somehow similar to that of Fig. 1a which indicates the fact that the atmospheric layer affected by the breeze is close to 3000 m, a level at which the circulation is reversed and the distance up to which the balloon is over the sea is approximately 3 km.

On the basis of the tests carried out at the Constanta station in the period 1961-1966, the generalized average curves of the variations of altitudes and distances obtained during the day and the night were plotted (Fig. 3). From this it is found that the daytime breeze (curve a) is obtained with winds weaker

[illegible] 3. [illegible]ţimea medie (m) la care [illegible] evidenţiază inversarea direc[illegible] vîntului. Curba de variaţie a [illegible] şi distanţei la care balonul [illegible] stratul afectat de briza de zi, [illegible] de briza de noapte, ora [illegible] Constanţa, iulie 1961 – 1966.

[illegible] 3. Mean altitude (m) where [illegible] puts into evidence an [illegible] wind direction. Variation [illegible] of height and distance where [illegible] the layer subject [illegible] by day, 13h (a) and [illegible] in the night, 1 h (b), [illegible], July 1961 – 66.

[illegible] (m) [illegible] 1961 1966.



Key: (1) Altitude in; (2) Distance from Constanta.

than the night ones (curve b) which is superimposed on the zonal circulation in direction. Thus during the day, at 1300 hours, for a balloon to travel a distance of 10 km over the land, it must reach an altitude of nearly 6000 m, whereas at night at 0100 hours, the balloon when it covers this distance has reached the altitude of 5200 m.

The fact that the distance at which the balloon may move is related directly to wind speed is demonstrated also by the very advanced position of the balloon in one of the observations carried out at 1300 hours (point a' on the figure) when because of the greater wind speed, it reaches only 3000 m altitude having traveled a distance over land of 17 km.

It is very important to note that through their form, these curves show the greater potential of the convection process taking place over land during the day than that taking place at night over the sea.

Because of the absence of sounding systems with balloons, it is difficult to estimate the real shapes and dimensions of the atmospheric strata affected by the invasion of sea air over the land, and that of the continental air over the sea during a circulation of the breeze type, but the wind rose obtained on the basis of the hourly data of the Medgidia station, located approximately 30 km away from the coast, indicates by its shape, quite similar to that at Constanta, that the sea air is carried by the breeze over this distance.

The graphic material obtained for the Hirsova station, located on a straight line with the Danube at approximately 70 km from the coast, indicates a strong attenuation of the effect of the sea on the atmospheric circulation. This situation which may appear along the entire bank of the Danube (between the areas of Ostrov and Tulcea) may have given rise to the false conclusion that the sea breeze stops its effect before reaching the Danube. Actually the attenuation of the sea breeze over the respective

portions of the banks directly on the Danube is due to the influence of the river and the areas covered between its branches which creates on a reduced scale a local circulation in the form of a breeze, but on the respective banks, its direction is opposite to that of the sea breeze. This explanation is also founded on the fact that in the stations located on the bank on the left side of the river, the sea breeze, greatly decreased as compared with the opposite bank, is reanimated and amplified through combination with a weaker breeze but of the same direction, created by the thermal contrast between Balta Ialomitei and Cimpia Dunarii.

The graphic material[1] obtained on the basis of the data from the stations of Fetesti, Marculesti and Dilga, located on a stretch toward the center of Cimpiei Romane indicates indeed the gradual attenuation until the disappearance of the effect of the Black Sea on the atmospheric circulation.

It may be understood that the potential of the influence of the transport from the sea, and consequently the degree of continentalization, depends on the contrast of the atmospheric parameters over land and sea, the wind speed and the distance traveled by the mass of sea wind over the territory over which it moves.

To reveal the continentalization process it is very important to know the dynamics of the diurnal variations of the temperature and humidity of the air as a function of the distance traveled by the sea air over the land. For this purpose, the hourly values of the temperature were classified according to the corresponding wind directions. Since it may be considered that in calm conditions, the temperature of the air of a certain place is a function of the amount of solar energy received by the respective active surface area, the conversion capacity of the

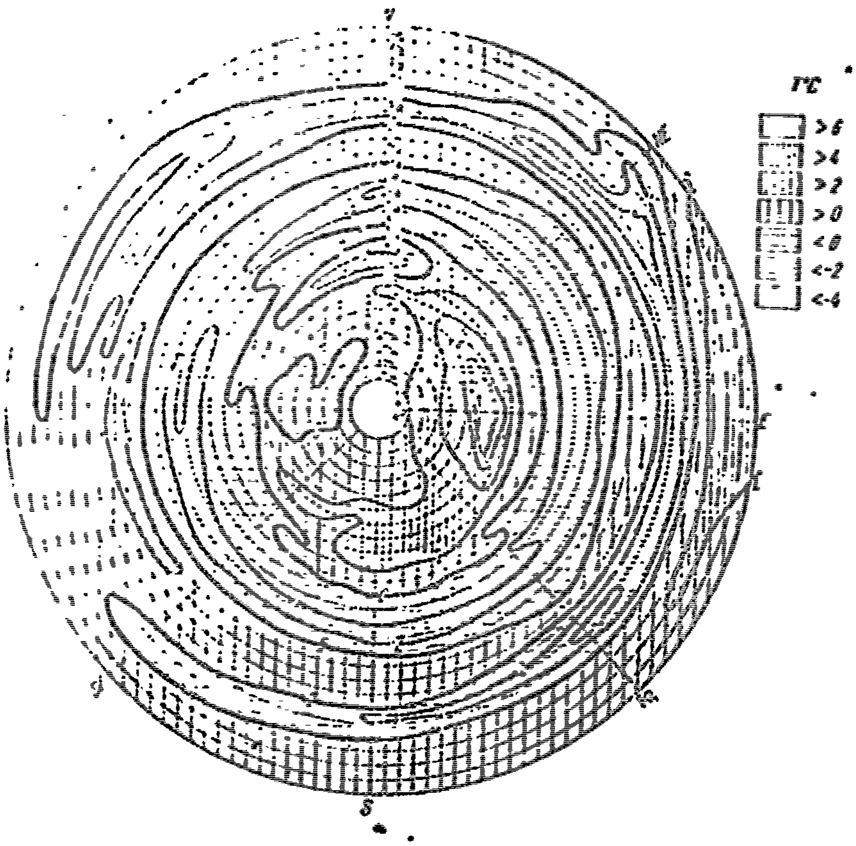
[1]For want of space it was impossible to present most of the graphic material obtained and used to interpret the phenomenon.

caloric energy yielded by this area within the framework of the thermal exchange with the atmospheric layer in contact, the average hourly temperature of the air was measured separately also for cases of calm. Consequently to know the contribution of sea air in the establishment of the thermal conditions of that part of the country, on the basis of the differences between the average hourly temperatures corresponding to the intervals with calm, wind distribution roses were established similar to those set up on the wind frequency according to direction.

Though because of the short interval of time (1961-1970) the differences as a function of direction do not appear very clearly, it may nevertheless be stated with certainty that this reflects strikingly the effect of the physical parameters of the sea air. From the analysis of the latter, it is observed that starting from 2100 hours, the air transported from the sea produces heating which on the coast in Constanta reaches its maximum values around 0400 hours (>3°), when because of the radiation of the night calm, the land air reaches the minimal temperatures. After the sunrise, within the time needed for the evaporation of the dewdrops, the differences become negative, and later, after a period of over an hour, there is once again an increase. The most marked drops in temperature occurring in calm conditions take place naturally between the hours 1200 and 1400.

Up to a certain distance the values of the temperatures increase because of the nocturnal advection of the sea air, thus in Medgidia (Fig. 4), it reached maximum values (>7°) around 0600-0700 hours. Between 1000-1300 and 1800-2000 hours, the air which comes from the sea is 4-5°C colder than the air over the land.

To reveal the proportions of the effect of the transport of sea air on the average temperatures in time and space, we use the method of the graphic representation of the differences of the average hourly temperatures which are obtained under conditions when the wind blows from the sea, even though it does not occur



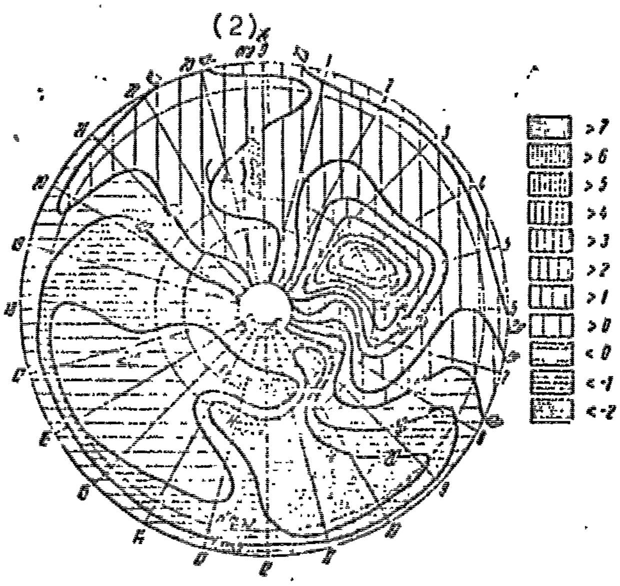
4 Difference between air mean temperature for various wind directions and air mean temperature for calm weather (°C), under anticyclonic regime, Medgidia, July 1961—70.

... of a breeze; this was obtained in conditions of ... series of 5 stations located at different distances ... from the sea coast to the interior of Baragan.

... method of representation consists of a series of ... circles (one for each station) and a series of rays ... to the 24 hours of the day. Thus for the inside ... established for the Constanta station, we recorded the ... values of the differences of the average hourly ... temperatures obtained in intervals when the wind blows from the ... and those recorded in calm periods. At the corresponding distances (considered in a straight line) according to a linear scale established as a function of the need, other circles were circumscribed for the meteorological stations: Valu lui Traian

(19 km), Medgidia (30 km), Hirsova (68 km), Fetesti (77 km). The values of the differences in temperature of the respective stations corresponding to each hour represented the basis on which isopletic lines were plotted which showed the value of the weight of the effect of the sea air on the temperature of the air in time and space.

Analyzing the synthetic graphic representation of Fig. 5 it is observed that around 2200-2300 hours the values of the temperatures of the air carried from the sea are generally equal to those of the land air (0°C isopletic line). Because of nocturnal radiation (which leads to the drop in temperature of the lower atmospheric layers), after midnight this difference becomes positive and increases gradually until 0400-0500 hours.



Fir. 5. Variaţia diurnă a diferenţei dintre temperatura ae-ului transportat de vînturile de est şi cea a atmosferei calme (°C) în funcţie de distanţa faţă de litoral în regim anticiclonic (iulie 1961–1970).

Fig. 5. Diurnal variation of the difference betw.en the temperature of the air blown by eastern winds and the temperature by calm weather (°C) relying on the distance from the coasts, under anticyclonic regime (July 1961–70).

Key: (1) Distance in km. (2) Hour.

We have data in time and space on areas whose great positive difference emphasizes the fact that the differences between the temperatures of calm air and that of the air transported from the sea are lower in the immediate vicinity of the coast, where the sea air invades the land in thin layers and at very low speeds so that the wind vane does not record them. The weight of this process by which the sea influences the temperature of the air over the land under conditions of calm decreases gradually over 20-25 km, when it disappears; during the time and in the places when the wind is from the east, it maintains a higher value for 35-40 km. Thus apparently the maximum contribution of the sea is achieved in an area located between the limit (extreme in space) of the effect at the time of calm and the distance over which the continentalization process of the sea air is accelerated.

This argument may lead to the idea that the afflux of sea air which takes place even in calm conditions maintains and preserves in time and space the physical characteristics of the air carried by the winds blowing from the sea.

Decreasing after sunrise, the difference drops rapidly until around 0800 hours. From that time, the values of the differences become negative and indicate that the air coming from the sea leads to the decrease in the temperatures which takes place on land in calm conditions. Between 1000 and 1300 hours, when because of the direct solar radiation, the continental air is greatly heated, the cooling caused by the sea air has an increasing weight. In the afternoon because of the increase in nebulosity and as a result of convection, the lower temperature of the land air decreases the differences.

Naturally the variation of the negative differences takes place very slowly in the afternoon and in the evening up to 2100-2200 hours, when they gradually become positive again in a time which decreases under the effect of direct radiation; the passage from the positive to negative values occurs much more quickly.

One should note the fact that during the time when the wind is from the east, the Danube influences in a similar manner the thermal conditions of the areas located on the left bank, but on a different scale, corresponding to its potential.

The characteristics of the south-eastern parts of Romania are formed similarly under the effect of larger amounts of humidity which when the wind blows from the sea, are carried to the interior of the country, reducing the deficit of the humidity of the atmosphere over an important agricultural area.

The same methods were used to process data from the measurements carried out of relative humidities.

To know, however the amount of water vapor contained in a unit volume of air, the average hourly values of the relative humidities corresponding to the direction of the wind and those corresponding to the calm conditions were converted into values of water vapor pressure and given in millibars.

On the basis of the differences between the values of the intervals with calm and those with wind, wind roses were established with the distribution of these parameters as a function of the direction of the wind.

The distribution in time and space of the differences between the vapor pressure of the interval with wind from those with calm conditions in the coastal zone (wind rose of the Constanta station, Fig. 6) shows a very plastic and decisive variation of the levels of vapor of the atmosphere as a function of the direction from which the wind blows as compared with the characteristic of the subjacent surface in the intervals of time without wind. It is apparent from the analysis that on summer days when the ground is strongly heated the wind blowing from the sea carries amounts of vapor exceeding those of the local atmosphere by 6-7 mb respectively even though the wind blowing from the land reduces to a certain extent the humidity content of the atmosphere of the coast.

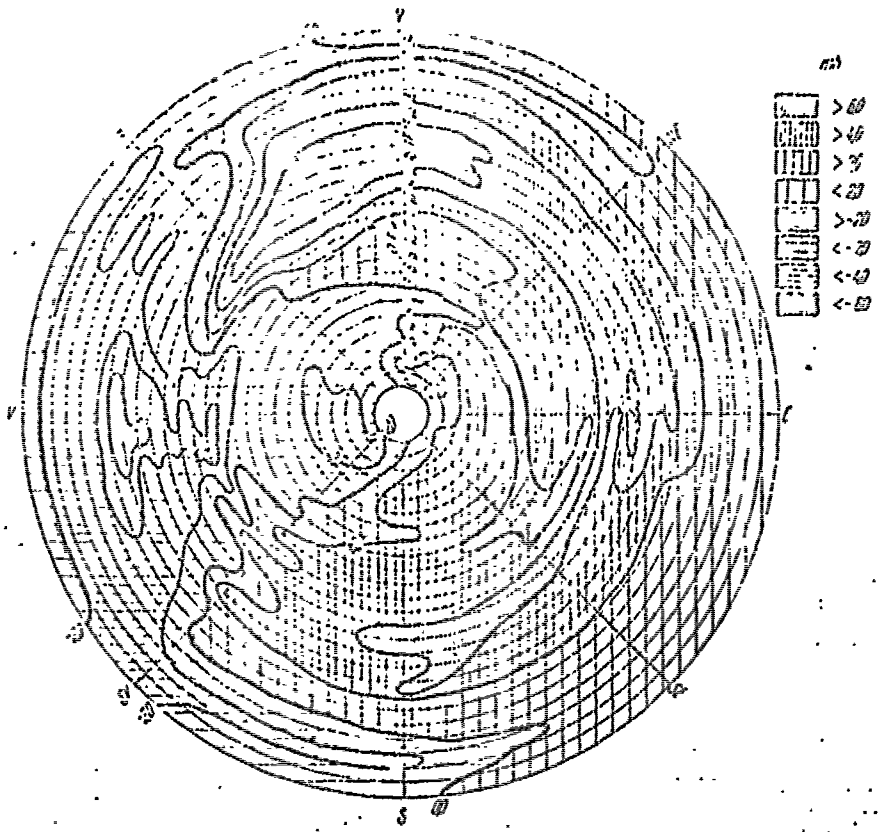


Fig. 6. Difference between mean tension of damp air in various wind directions and that by calm weather, under anticyclonic regime (Constantza, July 1961 –70).

The winds blowing from the sea produce the maximum increase between the times of 1400-1600 hours, when in calm conditions, the air contains the minimum level of humidity, but the largest drops take place between 1600 and 1800 hours, when the winds carry toward the sea dry continental air. Thus according to the direction in which the wind blows, the maximum amplitude of the variations of the amount of vapor on the coast may exceed 12 mb.

The contribution of the wind decreases naturally with the increase of the distance over which the air travels on the land. Thus over a distance of approximately 20 km from the coast (at the Valui lui Tralan station) the structure of the distribution

of the spatial differences and the differences between the amounts of moisture transported by the winds blowing from the sea and those of the land air are maintained close to those of Constanta; at the Medgidia station, located about 30 km away, there is indication of an obvious decrease in the contribution of the sea air.

To know the proportion of the contribution of the latter in the establishment of the moisture regimes in the studied zone, we used the method of isopletic representation of the distribution in time and space of the differences of moisture of the air in the interval of the east wind and the interval under calm conditions (Fig. 7).

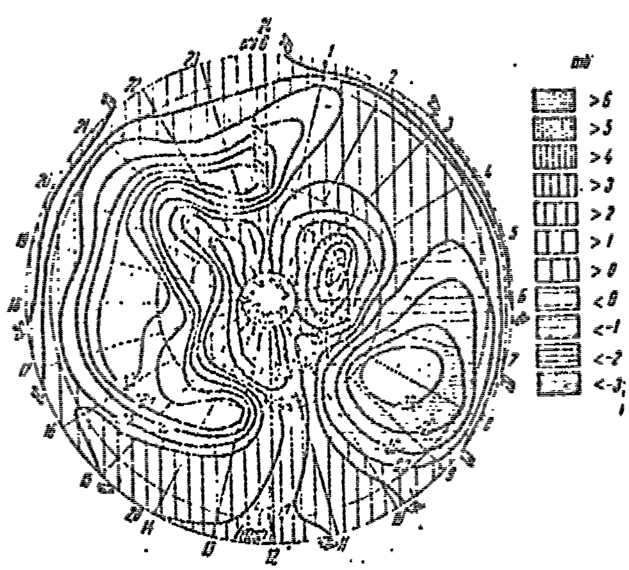


Fig. 7. Variația diurnă a diferenței dintre cantitatea de umezeală transportată de vînturile din est și cea a atmosferei calme (tensiunea în mb) în funcție de distanța față de litoral, în regim anticiclonic (iulie 1961—1970).

Fig. 7. Diurnal variation of the difference between damp air amounts blown by eastern wind and that by calm weather (tension in mb) as a function of the distance from the coasts, under anticyclonic regime (July 1961—70).

The distribution of this difference indicates the fact that during the time of advection of sea air we find the maximum contrast of values before sunrise, between 0300 and 0600 hours, at a distance of 10-20 km. This area is located in a time range in which the humidity of the calm atmosphere contributes to the formation of dew drops but in areas at a distance to which the amounts of vapor transported are still maintained at a considerable level.

In general this area is superimposed on that of the distribution of the warmer sea air (Fig 5) and is due to the same causes.

It is interesting to note that at noontime, when the continental air is very dry, the moist air which comes from the sea carried along by the breeze comes towards the center of Cimpiei Romane. The graphic representation of Fig. 7 illustrates strikingly the fact that during the month of July the air which is carried along by the wind blowing from the east in its passage over the Balta Ialomitei becomes loaded with new and large amounts of humidity which it carries to the interior of Baragan.

During the afternoon of the days with anticyclonic conditions, when the ground is heated, the amounts of water vapor resulting from the evaporation process and evapotranspiration are greater than those which may be brought by the wind from the sea over that distance. At that time of the day, the excess humidity carried by the wind from the east travels over a relatively short distance.

The large amount of humidity which is recorded after sunrise in the central region of Dobrogei, when the atmosphere is calm, is due in a great measure to the evaporation of dewdrops.

To know the extent in space of the influence of the sea under conditions in which the wind blows from the east, Fig. 8 gives the curves of the variation of the differences of temperatures and vapor pressures in the intervals with wind and those in calm conditions as a function of the distance reached

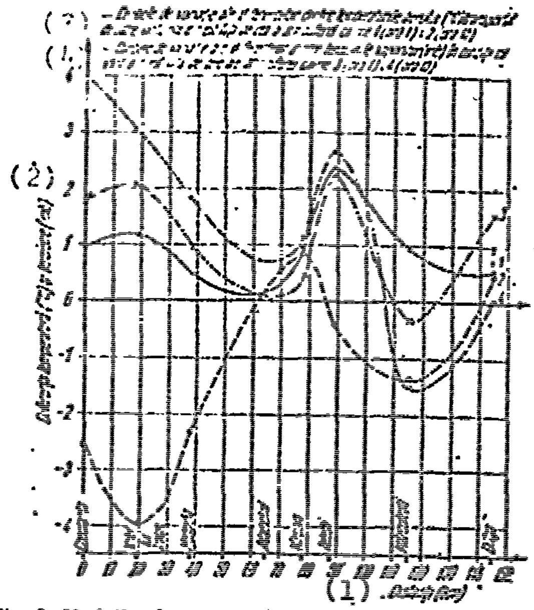


Fig. 8. Variația temperaturii (°C) și a tensiunii vaporilor (mb) în funcție de distanță în condiții cu vînt din est.

Fig. 8. Variation of temperature (°C) and damp air tension (mb) as a function of the distance from the coasts and with eastern wind blows.

Key: (1) Distance; (2) Difference in temperature (°C) and tension (mb); (3) Curves of variation of the difference between the temperature of the air (°C) carried by the wind blowing from the east and that of the calm atmosphere 1 (0100 hours) 2 (1300 hours); (4) Curves of variation of the difference between vapor pressure (mb) under the conditions with wind blowing from the east and that of calm atmosphere 3 (0100 hours) and 4 (1300 hours).

both during the day and at night. Since not all the stations for which the data were processed had carried out hourly observations of the wind, it was impossible to choose the most characteristic moment of the sea air transport. Therefore the respective curves were plotted on the basis of data resulting from the observation of 0100 and 1300 hours which, although they are not totally representative (as may be seen from Figs. 6 and 7, this does not pass through the most characteristic intervals of the day), indicates the proportion of the sea air contribution in the

establishment of the parameters of the temperature and humidity and the distance needed for the latter to start showing by continentalization the characteristics of land air, the distance at which the respective differences become zero.

It is interesting to show that although the atmospheric dynamics are affected by the sea over a large distance, the caloric potential of the air carried by the wind coming from the east drops continuously as it approaches the Danube.

Just as on the coast the infiltration of the air from the Danube, which takes place on calm nights in the form of thin layers (need for wind vane) over the banks, the differences of temperature start to attenuate, which may create the air transported by the east wind (Curve 1). The effects of this infiltration are most evident on the right bank, where the sea air reaches an advanced degree of continentalization. The maximum values of the differences between the temperatures recorded on the left bank (in Fetesti) during the time when the east wind blows and that recorded during the calm period shows clearly the fact that in the passage over Balta Ialomitei, the air stores up a large amount of caloric energy which is transported toward the center of Baragan.

The proportion of their differences at 1300 hours (curve 2) shows strikingly that at this time of day the wind which blows from the east with the maximum frequency has a greater transport potential than the night wind.

When the wind blows from Balta Ialomitei, the temperature of the air over Baragan which is very high may drop around noontime by about 2 degrees. Under favorable conditions the effect of the colder air over the Danube and its variations may be felt toward the west over a distance of up to 50 km.

The amount of humidity carried from the sea indicates very expressively the latter's contribution in the establishment of the main characteristics of the climate of the south-eastern parts of our country. Thus, during the period when the variations of temperature of the continental air are attenuated by the sea air both day and night, the amount of vapor carried by the wind blowing from the east always increases the humidity content of the continental atmosphere. Because of the larger amount of humidity of the land air, the excess created by the se. air at night is lower, but the continentalization is more manifest at night than in the daytime, when the saturation deficit is greater.

When the humid air from over the Balta Ialomitei is carried by the wind toward the west, the humidity content of the atmosphere of Baragan increases up to a distance of 30 to 40 km. The difference between the amount of humidity of the interval with calm and that when the wind comes from the east reaches its maximum values (2.3 mb at night; 2.7 mb daytime), in the immediate neighborhood of the left bank of the Danube, in Fetesti.

It is apparent from the graphic analysis of Fig. 8 that although in the region under anticyclonic conditions the atmosphere of the south-eastern part of Romania is under the influence of the Black Sea Basin up to a distance of over 100-200 km, the effect of the sea air carried by the wind blowing from the east on the main climatic element is not felt more than approximately 60 km away from the coast. But the sea breeze is reanimated from the dynamic viewpoint by the air it carries in the passage over Balta Ialomitei which modifies the thermal potential and becomes charged again with large amounts of humidity which it carries farther toward the center of Baragan.

To know the potential and the structure in time and space of the effect of the Black Sea Basin on the climatic characteristics in winter, a similar study should be carried out for the month of January.

It would be just as interesting from the theoretical point of view, and even more from the practical viewpoint, to know the weight of the effect in time and space of the draining of the marshes of Ialomitei and Brailei on the climate of Baragan.

The data which will be obtained from the measurements to be carried out in the future will make it possible to perform a comparative study of the modifications caused by man on the medium of the respective zone and the measures which would make this profitable. To complete the picture of the contribution of the Black Sea Basin in the establishment of the main characteristics of the climate of the south-eastern parts of Romania, it is necessary to process the total material resulting from the observations of all the stations located in the respective zones, including the stations located on the Danube Delta.

On the basis of the method of processing used in this study it is possible to know better the working principles of the mechanism of the dynamics of the atmosphere in the zone affected by the Black Sea, the potential of the difference in time and space of the latter, and the results combined with those of the swamps and the Danube Delta.

LITERATURE

1. Tistea, D. "Some Considerations on the Effect of the Black Sea on the Regimes of the Air Temperature in the South-eastern Zone of the Territory of the Romanian People's Republic," Hidrotehnica, Vol. X, No. 1, Bucharest, 1965.

2. Tistea, D. et al. "Graphic Method of Presentation of Some Wind Parameters," Hidrotehnica, Vol. 16, No. 11, Bucharest, 1971.

3. Clima Republicii Populare Romane (Climate of the Romanian People's Republic), Vol. I, Meteorology Institute, Bucharest, 1962.